

## Model 428F

**Number of Sections:** 4 independent sections with 4 inputs per section. A front-panel switch on each section which selects normal or inverting mode.

## INPUT

**No. of Inputs:** 4 per channel;  $50\ \Omega \pm 5\%$ ; direct-coupled in non-inverting mode. In inverting mode operates as a capacitively-coupled unit with a 400  $\mu$ sec time constant. Inputs protected against 0.5  $\mu$ sec transient overloads, up to  $\pm 5$  A.

**Signal Level Requirements:** Positive or Negative analog signals.

**Reflection Coefficient:** Less than 7% for inputs of 2 nsec rise time.

## OUTPUT

**No. of Outputs:** 4 per channel; reverse-terminated; direct-coupled; for optimum output shape, three outputs must be terminated into  $50\ \Omega$ . For proper operation, at least 2 outputs must be terminated on each channel used.

**Output Levels:** Linear range in normal mode is limited to: +100 mV to  $> -2$  V, with maximum amplitude of  $> -2$  V into  $50\ \Omega$  and gain of  $1.0 \pm 2\%$  up to  $-2$  V. Linear range in inverting mode: +100 mV to  $> -1.5$  V, with maximum amplitude of  $> -1.5$  V into  $50\ \Omega$  and gain of approximately 0.98 up to  $-1.5$  V.

**Rise Times:**  $\leq 2.5$  nsec, 10% to 90%, with outputs terminated in  $50\ \Omega$ .

**Fall Times:**  $\leq 4$  nsec 10% to 90%, with outputs terminated in  $50\ \Omega$ . Integral non-linearity:  $\pm 1\%$  up to  $-1$  V.

## MISCELLANEOUS

**DC Offset:** Adjustable with front-panel potentiometer. Care should be taken to readjust DC level whenever the Normal/Inverting switch is used. Stability:  $< 60\ \mu$ V/ $^{\circ}$ C in normal and inverting modes.

**Output DC Level Voltage Coefficient:**  $< 25\ \mu$ V/1% variation of any supply voltage in normal and inverting modes.

**Interchannel Isolation:** 40 dB.

**Noise:**  $< 750\ \mu$ V R.M.S.

**Overload Recovery:** Approximately 2 nsec with four simultaneous NIM level ( $-800$  mV) inputs.

## GENERAL

**Rate:** DC to 100 MHz typically.

**Input/Output:**  $< 6$  nsec.

**Duty Cycle Limitations:** None for direct-coupled outputs.

**Packaging:** RF-shielded AEC/NIM #1 module. Lemo-type connectors.

**Power Requirements:** 80 mA at +24 V, 80 mA at  $-24$  V, 160 mA at +12 V, 160 mA at  $-12$  V.

## Model 429A

**Number of Sections:** 4; may be cascaded by means of front-panel switch to form dual 8-fold fan-in/12-fold fan-out or single 16-fold fan-in/24-fold fan-out, with LED indication.

## INPUT

**Number of Inputs:** 4 per section;  $50\ \Omega \pm 5\%$ ; direct-coupled. Quiescent level is 0 V DC.

**Signal Level Requirements:** Standard NIM logical 1 input levels,  $-12$  mA to  $-36$  mA; Standard TTL logical 1 input levels, +2 V to +5 V; signal width must be 4 nsec minimum, FWHM.

**Reflection Coefficient:**  $< 10\%$  for input rise times  $\geq 2$  nsec.

## OUTPUT

**Number of Outputs:** 4 normal (2 bridged pairs); 2 complementary (1 bridged pair).

**Output Levels:** Normal NIM (quiescently 0 mA,  $-32$  mA into two  $50\ \Omega$  loads during output). Complementary NIM (quiescently 32 mA into two  $50\ \Omega$  loads, 0 mA during output). Duration is equal to the logical sum of the input durations.

**Rise Times:** 2.3 nsec typical, 2.8 nsec maximum.

**Fall Times:** 2.3 nsec typical, 2.8 nsec maximum.

## MISCELLANEOUS

**Time Variation of Output with Input Amplitude:**  $< 1$  nsec worst case between inputs of  $-600$  mV and  $-1.6$  V; typically  $< 0.5$  nsec.

**Time Variation Between Outputs:** 4 channels, 4 x 6 operation:  $< 0.2$  nsec; 2 channels, 8 x 12 operation:  $< 0.4$  nsec; 1 channel, 16 x 24 operation:  $< 0.9$  nsec.

## GENERAL

**Rate:** DC to 100 MHz.

**Input/Output:**  $< 6.5$  nsec.

**Duty Cycle Limitations:** None.

**Packaging:** RF-shielded AEC/NIM #1 module. Lemo-type connectors.

**Power Requirements:** 35 mA at +12 V, 50 mA at  $-12$  V, 295 mA at +6 V, 460 mA at  $-6$  V.